



Report on the Joint IHO-Singapore Innovation and Technology Laboratory

**Presented at UN-GGIM & IHO Joint Working Group
on Marine Geospatial Information Meeting
Chiang Mai, Thailand
04 – 08 May 2026**



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Hydrographic
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Objectives of IHO-Singapore Lab

01 Facilitate

The conduct of innovative or **investigative projects** proposed by IHO Member States(s), IHO organs, or other stakeholders. (including test bedding)

02 Enable

Knowledge creation and foster collaboration to evaluate specifications of global standard setting within the scope of IHO standardization activities

03 Foster

A multidisciplinary and collaborative environment for technical experts to interact learn and promote new solutions and technologies, including collaboration and cooperation with **other international organizations** research and development bodies active in the maritime domain under the guidance of a Governing Board



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IHO-SINGAPORE LAB - PROJECTS UPDATES

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- 1. S-131 Project**
- 2. S-102 Project**
- 3. Dual-fuel ENC's Project**
- 4. Integration of Land and Sea Datum Project**



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1. S-131 MARINE HARBOUR INFRASTRUCTURE DATABASE

[Ongoing]

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Goals of the Project:

- Create a **database and interface** that will **improve the information exchange** between harbours and hydrographic offices by acting as a **neutral repository** of harbour information.
- Database <https://port-data.net/s131/> will continue to be maintained at the IHO-SG Lab for potential contribution from Harbour and Port Authorities.

Updates on activities since HSSC-16:

- Develop a user guide for onboarding and familiarisation for viewing or port data input/editing.
- Invite Member States to test the tools and provide feedback to the project team.
- Promote harbour and port data contributions through IAPH, IHMA and other publicity efforts.
- Port of Montreal & Port of Vancouver began in Nov 2024.

Headed by:
Sarah Rahr, Canadian Hydrographic
Services



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1. S-131 MARINE HARBOUR INFRASTRUCTURE DATABASE

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S-131 Project | Port List | S-131 (0) | Resource | View | Save

Menu Bar

User Guide Settings Help

Help
User Guide
Update List
Contact Us

SAMPLE - Data

Search

- InformationTypes
- HarbourAreaAdministrative
- HarbourAreaSection
 - AA.CAHAL.HarbourAreaSection.0
 - AA.CAHAL.HarbourAreaSection.100
 - AA.CAHAL.HarbourAreaSection.101
 - AA.CAHAL.HarbourAreaSection.102
 - AA.CAHAL.HarbourAreaSection.103
 - AA.CAHAL.HarbourAreaSection.104
 - AA.CAHAL.HarbourAreaSection.105
 - AA.CAHAL.HarbourAreaSection.106
 - AA.CAHAL.HarbourAreaSection.107
 - AA.CAHAL.HarbourAreaSection.108
 - AA.CAHAL.HarbourAreaSection.109
 - AA.CAHAL.HarbourAreaSection.110
 - AA.CAHAL.HarbourAreaSection.200
- Terminal
 - AA.CAHAL.Terminal.00
 - AA.CAHAL.Terminal.01
 - AA.CAHAL.Terminal.02
 - AA.CAHAL.Terminal.03
 - AA.CAHAL.Terminal.04
 - AA.CAHAL.Terminal.05

Feature layer browser

AA.CAHAL.HarbourAreaSection.303

AA.CAHAL.HarbourAreaSection.304

AA.CAHAL.HarbourAreaSection.305

AA.CAHAL.HarbourAreaSection.306

AA.CAHAL.HarbourAreaSection.307

AA.CAHAL.Terminal.00

AA.CAHAL.Terminal.01

AA.CAHAL.Terminal.02

AA.CAHAL.Terminal.03

AA.CAHAL.Terminal.04

AA.CAHAL.Terminal.05

Feature Layer Expand Collapse

44.686501 -63.631240

Map view

Legend:

- Port Unicode(WPI)
- SMDG Terminal Code
- ISPS Port Facility

Toolbar

100% | Tool Layer

Data View

AA.CAHAL.HarbourAreaSection.102

Attribute	Value
featureName	Prior to MacKay Bridge

Association

Role	Object
componentOf	#AA.CAHAL.HarbourAreaAdministrative.1
subUnit	#AA.CAHAL.HarbourAreaSection.110
subUnit	#AA.CAHAL.HarbourAreaSection.0
subUnit	#AA.CAHAL.HarbourAreaSection.109
layoutUnit	#AA.CAHAL.Terminal.02
layoutUnit	#AA.CAHAL.Terminal.05
layoutUnit	#AA.CAHAL.Terminal.14
layoutUnit	#AA.CAHAL.Berth.34
layoutUnit	#AA.CAHAL.Berth.36

Data view

View of a sample dataset in <https://port-data.net/s131/>



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1. S-131 MARINE HARBOUR INFRASTRUCTURE DATABASE

User Guide

[2.1 Graphical User Interface \(GUI\) Layout](#)

[2.2 Menu Bar](#)

[2.2.1 Database menu](#)

[2.2.2 Resource menu](#)

[2.2.3 Settings menu - WMS/WMTS](#)

[2.2.4 Save the editing](#)

[2.3 Feature Layer Browser](#)

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[2.4.1 Identify a feature on map](#)

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[2.5 Data View](#)

[2.6 Toolbar](#)

[2.6.1 Cursor location, search & go to](#)

[2.6.2 Transparency and layer visibility](#)

[2.6.3 Text label](#)

[2.6.4 Measuring distance and angle](#)

[Chapter 3 Database Management](#)

[3.1 Port of Focus](#)

[Chapter 1 Introduction](#)

[1.1 The S-131 Project](#)

[1.2 Login to the VIPweb](#)

[Chapter 2 VIPweb GUI - Overview](#)

[2.1 Graphical User Interface \(GUI\) Layout](#)

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User guide for <https://port-data.net/s131/>

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2. DEMONSTRATE INTEROPERABILITY OF S-101 AND S-102 ON A PROTOTYPE S-100-COMPATIBLE ECDIS

[ongoing]

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Goals of the Project:

- Analyse impact of bathymetric data obtained at different frequencies for S-102 product.
- **Interfacing S-102 with S-101** on a prototype S-100 ECDIS to explore display options to best match user needs & requirements without cluttering of information, including in conformance with S-98.

Updates on activities since HSSC-16:

- Create sample S-102 dataset using S-100py script on IHO repository. Still in progress.

Headed by:
Korean Hydrographic and
Oceanographic Agency (KHOA)

Participating parties:
Maritime and Port Authority of
Singapore



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3. DUAL FUEL (S-57 AND S-101) PROJECT

[completed]

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Goals of the Project:

- Demonstrate to the shipping community and other users that the IHO and our stakeholders stand ready to **make available S-101 ENC**s covering major shipping routes ahead of the **1 January 2026** commitment to the IMO
- **Coordinate & provide** S-57 and S-101 ENC's covering Malacca and Singapore Straits (Phase 1) and planned routes for the Round-the-World (Phase 2) tour by Italian vessel "*AMERIGO VESPUCCI*"
- Test **portrayal of both S-57 and S-101 ENC**s on a prototype Dual Fuel S-100 ECDIS, and **wireless updating** of the S-101 ENC's, while at sea

(Phase 1) HOs of Indonesia, Malaysia, and Singapore, Japan Hydrographic Association

(Phase 2) Italian Hydrographic Institute (IIM), Australian Hydrographic Office (AHO)

Participating parties:

HOs of ROK (KHOA), Japan (JHOD), UK (UKHO) and USA(NOAA), IC-ENC, software OEMs



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3. DUAL FUEL (S-57 AND S-101) PROJECT

[completed]

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Updates on activities since HSSC-16:

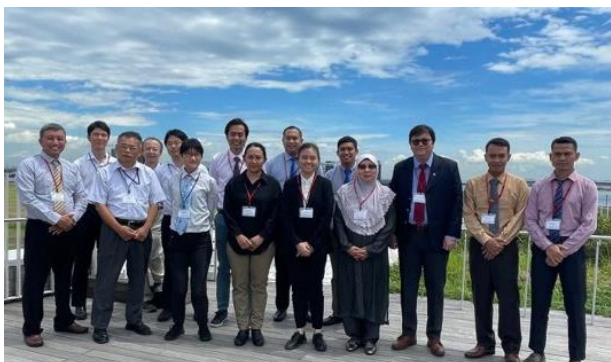
- Bi-weekly virtual meetings with project partners
- MSS-ENC Harmonisation Workshops, Jun and Jul 2024
- Malacca and Singapore Straits (MSS) ENC Sea Demonstrations, Aug and Sep 2024
- Italian Training Ship “*AMERIGO VESPUCCI*” Sea Demonstrations and joint media release, Oct 2024
- Pending submission of final report

3. DUAL FUEL (S-57 & S-101) PROJECT - PHASE 1

Dual Fuel MSS-ENCs Harmonisation workshops



1st Workshop (Singapore), June 2024



2nd Workshop (Japan), July 2024

Dual Fuel MSS-ENCs Sea Demonstrations



1st Sea Demo (Indonesia), Aug 2024



2nd Sea Demo (Singapore), Sep 2024

- Collaborative efforts from the 3 littoral HOs (Indonesia, Malaysia, Singapore) and project partners.
- Testing on conversion, validation, production and update of S-101 based on Edition 1.2.
- Sea demonstrations were conducted using KHOA prototype S-100 DF ECDIS with focus on the mariner's perspective for chart features critical to navigation to observe potential implications of dual-fuel concept display as inputs to S-98.
- Encourage further development of both production software tools and S-100 ECDIS and make available ways for the stakeholders to test both S-101 ENC and S-57 ENC in a dual-fuel mode during this transition period.

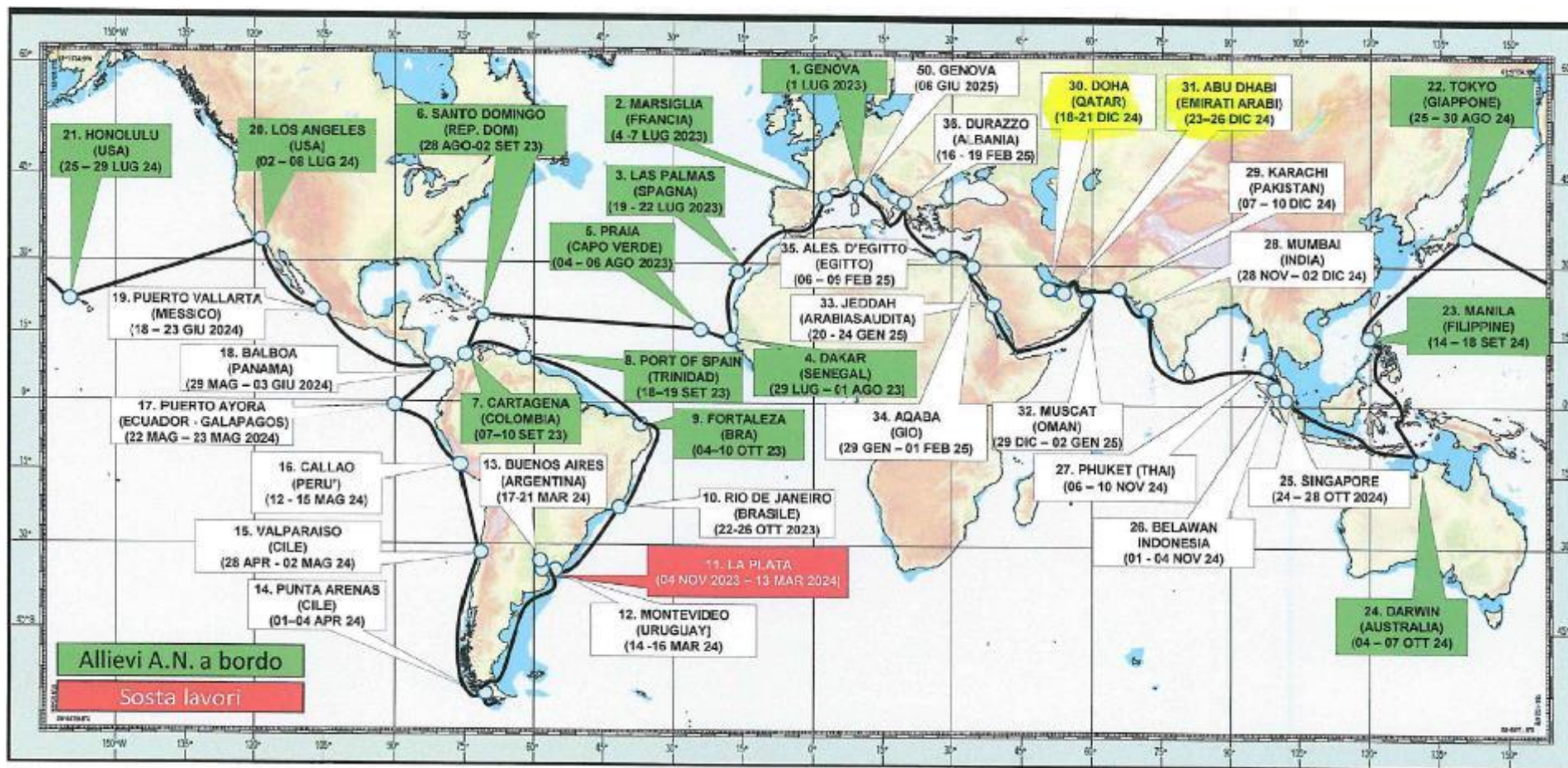


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3. DUAL-FUEL (S-57 AND S-101) PROJECT - PHASE 2

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Round-the-World route by Italian Navy vessel "Amerigo Vespucci"





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3. DUAL-FUEL (S-57 AND S-101) PROJECT - PHASE 2

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“Amerigo Vespucci” Sea Demonstration in Darwin, Australia, and in MSS,
Oct 2024



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4. INTEGRATION OF LAND AND SEA DATUM TO POTENTIALLY ADDRESS COASTAL INUNDATION SCENARIOS

[ongoing]

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Goals of the Project:

- Explore and investigate how the datums for i) **sea level** data and ii) **geodetic** data can be **integrated** to facilitate the development of better applications, such as for evaluating the impact of climate change, natural disasters or extreme weathers along the coastlines.
- Encourage collaboration between **hydrographers and land surveyors** on innovative solutions to reach shared objectives.

Updates on activities since HSSC-16:

- Partners will **investigate integration** at two levels:
 - **Sensor-Level Integration** – Co-locating offshore GNSS stations and tide gauges (see image on left) to improve the accuracy of relative sea-level rise monitoring and prediction.
 - **Data-Level Integration** – Merging Digital Elevation Models and bathymetric data for coastal planning and monitoring use-cases.

Outcomes:

- Outcomes from the project will be **included in the reference guide on land-sea integration** by the United Nations Global Geospatial Information Management *Marine Geospatial Information Working Group* (MGI-WG) and *Expert Group on Land Administration and Management* (EG-LAM).
- The reference guide aims to **compile use-cases and best-practices** in land-sea integration, identifying **potential steps to accelerate collaboration** through the 9 Strategic Pathways of the UN-IGIF and UN-IGIF Hydro.

Participating Parties:
Singapore Land Authority,
Maritime and Port Authority of Singapore



Potential GNSS location (operated by land authority) on Singapore's southern-most island, for potential co-location with HO's tide gauge.



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PROPOSED POTENTIAL OF NEW PROJECT: QUESTIONNAIRE ON USING OF AI-ENABLED SOLUTIONS IN HYDROGRAPHY

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- **Primary Focus**
- To collate information from Hydrographic Offices on their use or/and potential use of Artificial Intelligence (AI) in hydrographic operations and workflows.

- **Main objectives**
- Identify the AI being used;
- Understand current AI trends in hydrographic work;
- List the benefits; and
- Identify successes in AI applications in different areas of work.

- **Deliverable**
- Results to be shared with Member States to facilitate knowledge sharing of knowledge
- Support wider AI adoption across the hydrographic community.



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ACTIONS REQUESTED FROM HSSC-17

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Request HSSC-17 to note the Report on the IHO-SG Lab:

- HSSC-17 to note the Report; and
- HOs and industry stakeholders strongly encouraged to actively engage and support in identifying and participate in **collaborative projects**.